FACT SHEET

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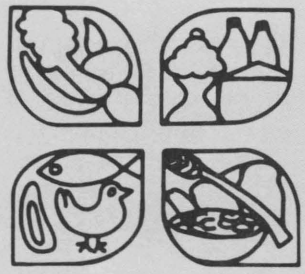

TRACE MINERALS

Sally S. Coble*

Trace minerals are essential nutrients present in very small amounts in the body. They perform functions necessary to the maintenance of life, growth and reproduction.

Trace minerals needed for good human nutrition include chromium, cobalt, copper, fluoride, iodine, iron, selenium and zinc. Other minerals such as manganese, molybdenum, nickel, silicon, tin and vanadium are necessary in certain animals, but there is not as much information about their role in humans.

The general population evidentally has an adequate intake of most of these minerals because deficiency symptoms have not been detected. However, some recent nutrition surveys indicate that marginal deficiencies of iron, zinc and chromium may occur among certain age groups in the United States. Exact deficiency symptoms in humans are not known for recently discovered trace minerals, so there actually may be more widespread deficiencies.

Trace minerals, like all nutrients, may be harmful if consumed in excessive amounts. Unlike most nutrients, effects of their excessive intake may go unnoticed for a long time.

Trace minerals function mainly in enzyme reactions in the cells. They are absorbed in the small intestine, like most nutrients. In the body, trace minerals attach to compounds such as protein and depend on them for transport, storage and function.

Functions and food sources of most trace minerals needed in human nutrition will be discussed in this fact sheet. Publications about other mineral elements also are listed.

Chromium

Chromium is necessary in humans, but a specific dietary allowance has not been set. Chromium helps maintain the normal rate of glucose removal from the bloodstream. A lack of chromium may be related to diabetes. Studies also show that amounts of chromium in the body decrease with age, but this could be caused by inadequate dietary intake.

Major food sources of chromium are meat, liver, cheese, whole grain products and brewers' yeast. Chromium, like other trace minerals except iron, is lost during the milling of grains and is not added during enrichment.

Cobalt

Cobalt is part of vitamin B_{12}, necessary for normal blood formation. The dietary requirement for cobalt is unknown and deficiency symptoms have not been established. The body cannot make vitamin B_{12}, so dietary cobalt is not used for this purpose. Very little cobalt is stored in the body. The best known dietary sources of cobalt are leafy green vegetables.

Copper

Copper aids in the storage, and release from storage, of iron to form hemoglobin for red blood cells. The daily requirement of copper is about two milligrams; this amount is easily consumed in a varied diet.

The liver is the chief storage organ. If a pregnant woman has an adequate copper intake, the infant will be born with a good supply. This is particularly important during the early months when the infant's diet is predominantly milk, which is low in copper.

Copper occurs in most unprocessed foods. Organ meats, shellfish, nuts, raisins and dried legumes are rich sources of this mineral.

Fluoride

Fluoride is important because it normally is present in bones and teeth, and a certain amount is needed to achieve maximum resistance to tooth decay. It provides a protective effect on teeth beginning in infancy and lasting through adult life. Also, fluoride probably reduces mineral loss from the skeleton and makes bone more resistant to osteoporosis, a bone disease common along older women.

*Extension foods and nutrition specialist, The Texas A&M University System.

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Fluoride is present in small, but widely varying concentrations, in most soils, water supplies, plants and animals. Fluoride concentration in the drinking water of about one part per million has been shown to decrease tooth decay. Seafoods and tea are the best food sources of fluoride.

Fluoride, like other trace minerals, is toxic when consumed in excessive amounts over an extended time. Mottling of the tooth enamel occurs; in extreme cases the enamel may become pitted and the teeth appear stained and corroded. This is common in sections of the Panhandle and West Texas where the natural water supply is high in fluroide.

Iodine

Iodine is required by the body in extremely small amounts for normal functioning of the thyroid gland. It becomes part of thyroid hormones which control the individual's metabolic rate. The thyroid gland enlarges without dietary iodine. This condition is known as simple or endemic goiter.

The daily requirement for iodine is shown in table 1. This amount is met easily by using iodized salt. Labels indicate if the salt has been iodized. The voluntary process of adding iodine to salt reduces iodine-deficiency goiter once common in certain inland areas of the United States where soils contain little iodine. Best food sources of iodine are seafoods, milk and breads processed with iodine-containing compounds.

Selenium

Selenium and vitamin E seem to perform similar functions. As part of enzymes, selenium destroys certain substances which cause fat breakdown. Thus selenium may act as an antioxidant in the body.

Table 1. Recommended daily dietary allowance

	Age (years)	Iodine (micrograms)	Zinc (milligrams)
Infants	0.0-0.5	35	3
	0.5-1.0	45	5
	1-3	60	10
	4-6	80	10
	7-10	110	10
Males	11-14	130	15
	15-18	150	15
	19-22	140	15
	23-50	130	15
	51+	110	15
Females	11-14	115	15
	15-18	115	15
	19-22	100	15
	23-50	100	15
	51+	80	15
Pregnant		125	20
Lactating		150	25

The exact requirement for selenium has not been established. However, high-protein foods such as meats and seafoods, and cereal grains grown in selenium-rich soils, are its richest sources. The average varied American diet probably provides selenium in needed amounts.

Zinc

Some studies show that zinc deficiencies cause delayed wound healing and loss of the senses of taste and smell. Zinc also is an important part of the enzymes whose functions include moving carbon dioxide via the red blood cells from the tissues to the lungs where it can be exhaled.

The daily requirement for zinc, as shown in table 1, is met through well balanced diets. Best food sources of zinc are animal protein foods including seafoods, meat and eggs. Legumes and whole grain products also provide zinc, but zinc may not be completely available for absorption in the body because of the presence of other substances such as phytin. Low-cost diets containing mainly vegetable protein sources usually are marginal in zinc.

Excess zinc may be harmful; acid foods may dissolve enough zinc from galvanized iron cooking utensils and containers to cause stomach upset.

References

Burton, B. T. *Human Nutrition,* H. J. Heinz Company, New York, 1976.

Demon, G. E. "A Primer on Dietary Minerals," *Food and Drug Administration Consumer,* September 1974, pp. 4-7.

Food and Nutrition Board — National Research Council, "Recommended Dietary Allowances," Eighth Revised Edition, 1974.

Levander, O. A. "Selenium and Chromium in Human Nutrition," *Journal of the American Dietetic Association* 66:338, 1975.

Other Extension Publications about Minerals

L-1362 *Iron*
L-1381 *Calcium*
L-1499 *Macrominerals: Phosphorus, Potassium, Sodium and Magnesium*

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